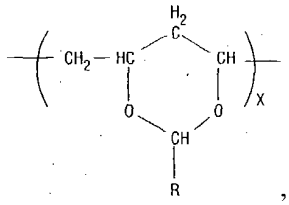
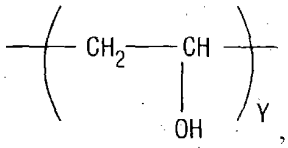
WHAT IS CLAIMED IS:

1. An oxygen barrier composition, comprising a modified ethylene vinyl alcohol polymer (EVOH) comprising an oxygen scavenging functional group.

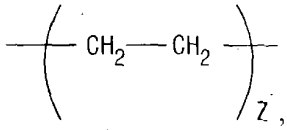
2. The oxygen barrier composition of claim 1, wherein the modified EVOH comprises structures IV, V, and VI:



(IV) ,



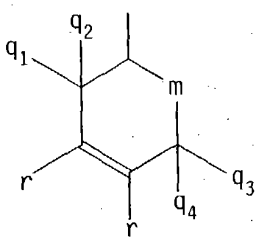
(V) ,



(VI) ,

wherein x is an integer greater than or equal to 1, y is an integer greater than or equal to 1, z is an integer greater than or equal to 1, and R comprises a cycloalkenyl group.

3. The oxygen barrier composition of claim 2, wherein R has structure II:



(II)

wherein q_1, q_2, q_3, q_4, and r are independently selected from hydrogen, methyl, or ethyl; m is $-(CH_2)_n-$, wherein n is an integer from 0 to 4, inclusive; and, when r is hydrogen, at least one of q_1, q_2, q_3, and q_4 is also hydrogen.

4. The oxygen barrier composition of claim 3, wherein y is greater than or equal to 1, z is greater than or equal to 1, n is 1, and q_1, q_2, q_3, q_4, and r are hydrogen.

5. The oxygen barrier composition of claim 2, further comprising a transition metal catalyst.

6. The oxygen barrier composition of claim 5, wherein the transition metal catalyst is a cobalt salt.

7. The oxygen barrier composition of claim 6, wherein the cobalt salt is selected from cobalt oleate, cobalt stearate, or cobalt neodecanoate.

8. The oxygen barrier composition of claim 2, further comprising a photoinitiator.

9. The oxygen barrier composition of claim 8, wherein the photoinitiator is selected from benzophenone derivatives containing at least two benzophenone moieties and having the formula:

$$A_a(B)_b$$

wherein

A is a bridging group selected from sulfur; oxygen; carbonyl; -SiR"$_2$-, wherein each R" is individually selected from alkyl groups containing from 1 to 12 carbon atoms, aryl groups containing 6 to 12 carbon atoms, or alkoxy groups containing from 1 to 12 carbon atoms; -NR"'-, wherein R"' is an alkyl group containing 1 to 12 carbon atoms, an aryl group containing 6 to 12 carbon atoms, or hydrogen; or an organic group containing from 1 to 50 carbon atoms;

a is an integer from 0 to 11;

B is a substituted or unsubstituted benzophenone group; and

b is an integer from 2 to 12.

10. The oxygen barrier composition of claim 9, wherein the photoinitiator is selected from dibenzoyl biphenyl, substituted dibenzoyl biphenyl, benzoylated terphenyl, substituted benzoylated terphenyl, tribenzoyl triphenylbenzene, substituted tribenzoyl triphenylbenzene, benzoylated styrene oligomer, or substituted benzoylated styrene oligomer.

11. The oxygen barrier composition of claim 2, further comprising an antioxidant.

12. The oxygen barrier composition of claim 11, wherein the antioxidant is selected from 2,6-di(t-butyl)-4-methylphenol(BHT), 2,2'-methylene-bis(6-t-butyl-p-cresol), triphenylphosphite, tris-(nonylphenyl)phosphite, vitamin E, tetra-bismethylene 3-(3,5-ditertbutyl-4-hydroxyphenyl)-propionate methane, or dilaurylthiodipropionate.

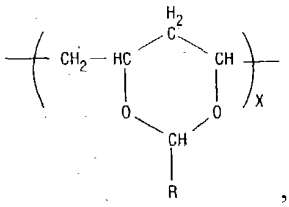
13. The oxygen barrier composition of claim 2, wherein the composition is a blend comprising the modified EVOH and an unmodified EVOH.

14. The oxygen barrier composition of claim 13, wherein the blend comprises from about 5 wt% to about 20 wt% modified EVOH.

15. A packaging article, comprising:

an oxygen barrier layer, which comprises a modified ethylene vinyl alcohol polymer (EVOH) comprising an oxygen scavenging functional group.

16. The packaging article of claim 15, wherein the modified EVOH comprises structures IV, V, and VI:



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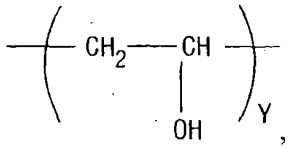
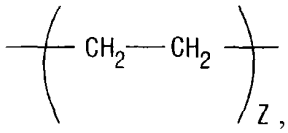
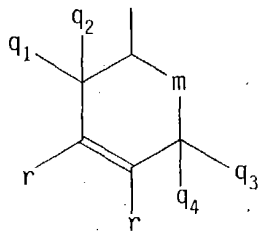
(V)  ,

(VI)  ,

wherein x is an integer greater than or equal to 1, y is an integer greater than or equal to 1, z is an integer greater than or equal to 1, and R comprises a cycloalkenyl group.

17. The packaging article of claim 16, wherein R has structure II:

(II) 

wherein q_1, q_2, q_3, q_4, and r are independently selected from hydrogen, methyl, or ethyl; m is $-(CH_2)_n-$, wherein n is an integer from 0 to 4, inclusive; and, when r is hydrogen, at least one of q_1, q_2, q_3, and q_4 is also hydrogen.

18. The packaging article of claim 17, wherein y is greater than or equal to 1, z is greater than or equal to 1, n is 1, and q_1, q_2, q_3, q_4, and r are hydrogen.

19. The packaging article of claim 16, comprising two or more oxygen barrier layers which comprise a modified ethylene vinyl alcohol polymer (EVOH) comprising an oxygen scavenging functional group.

20. The packaging article of claim 16, further comprising a transition metal catalyst in the oxygen barrier layer or a layer adjacent to the oxygen barrier layer.

21. The packaging article of claim 20, wherein the transition metal catalyst is a cobalt salt.

22. The packaging article of claim 21, wherein the cobalt salt is selected from cobalt oleate, cobalt stearate, or cobalt neodecanoate.

23. The packaging article of claim 16, further comprising a photoinitiator in the oxygen barrier layer.

24. The packaging article of claim 23, wherein the photoinitiator is selected from benzophenone derivatives containing at least two benzophenone moieties and having the formula:

$A_a(B)_b$

wherein

A is a bridging group selected from sulfur; oxygen; carbonyl; -SiR"$_2$-, wherein each R" is individually selected from alkyl groups containing from 1 to 12 carbon atoms, aryl groups containing 6 to 12 carbon atoms, or alkoxy groups containing from 1 to 12 carbon atoms; -NR"'-, wherein R"' is an alkyl group containing 1 to 12 carbon atoms, an aryl group containing 6 to 12 carbon atoms, or hydrogen; or an organic group containing from 1 to 50 carbon atoms;

a is an integer from 0 to 11;

B is a substituted or unsubstituted benzophenone group; and

b is an integer from 2 to 12.

25. The packaging article of claim 24, wherein the photoinitiator is selected from dibenzoyl biphenyl, substituted dibenzoyl biphenyl, benzoylated terphenyl, substituted benzoylated terphenyl, tribenzoyl triphenylbenzene, substituted tribenzoyl

triphenylbenzene, benzoylated styrene oligomer, or substituted benzoylated styrene oligomer.

26. The packaging article of claim 16, further comprising an antioxidant in the oxygen barrier layer.

27. The packaging article of claim 26, wherein the antioxidant is selected from 2,6-di(t-butyl)-4-methylphenol(BHT), 2,2'-methylene-bis(6-t-butyl-p-cresol), triphenylphosphite, tris-(nonylphenyl)phosphite, vitamin E, tetra-bismethylene 3-(3,5-ditertbutyl-4-hydroxyphenyl)-propionate methane, or dilaurylthiodipropionate.

28. The packaging article of claim 16, wherein the oxygen barrier layer comprises a blend of the modified EVOH and an unmodified EVOH.

29. The packaging article of claim 28, wherein the blend comprises from about 5 wt% to about 20 wt% modified EVOH.

30. The packaging article of claim 16, further comprising a second oxygen barrier layer not comprising a modified EVOH.

31. The packaging article of claim 30, wherein the second oxygen barrier layer comprises poly(ethylene vinyl alcohol) (EVA), polyacrylonitrile, polyvinyl chloride (PVC), poly(vinylidene dichloride), polyethylene terephthalate (PET), or polyamide.

32. The packaging article of claim 16, further comprising a structural layer.

33. The packaging article of claim 32, wherein the structural layer comprises polyethylene, low density polyethylene, very low density polyethylene, ultra-low density polyethylene, high density polyethylene, polypropylene, polyethylene terephthalate (PET), polyethylene naphthalate (PEN), nylon, polyvinyl chloride, ethylene-vinyl acetate,

ethylene-alkyl (meth)acrylates, ethylene-(meth)acrylic acid, or ethylene-(meth)acrylic acid ionomers.

34. The packaging article of claim 33, wherein the structural layer comprises PET.

35. The packaging article of claim 16, further comprising a moisture barrier layer.

36. The packaging article of claim 35, wherein the moisture barrier layer comprises polyethylene, polyethylene terephthalate (PET), or a mixture thereof.

37. The packaging article of claim 16, further comprising an oxygen scavenging layer.

38. The packaging article of claim 37, wherein the oxygen scavenging layer is a liner, coating, sealant, gasket, adhesive insert, non-adhesive insert, or fibrous mat insert in the packaging article.

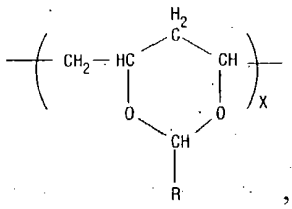
39. The packaging article of claim 16, wherein the packaging article is in the form of a single layer film, a multilayer film, a single layer rigid article, or a multilayer rigid article.

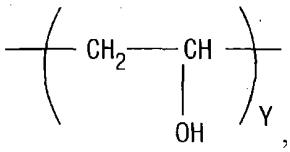
40. A method of making a modified ethylene vinyl alcohol polymer (EVOH) comprising an oxygen scavenging functional group, comprising:

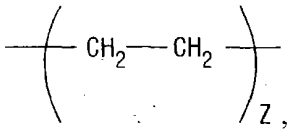
(i) providing (a) an ethylene vinyl alcohol (EVOH) copolymer, (b) an aldehyde comprising an olefinic or benzylic group, and (c) a catalyst; and

(ii) reacting the EVOH copolymer and the aldehyde in the presence of the catalyst under temperature and pressure sufficient to form the modified ethylene vinyl alcohol polymer.

41. The method of claim 40, wherein the modified EVOH comprises structures IV, V, and VI:

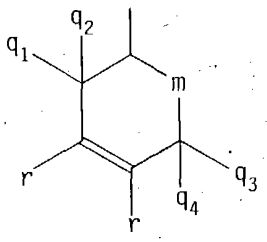
(IV)  ,

(V)  ,

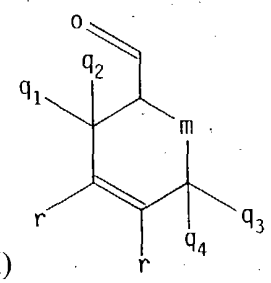
(VI)  ,

wherein x is an integer greater than or equal to 1, y is an integer greater than or equal to 1, z is an integer greater than or equal to 1, and R comprises a cycloalkenyl group.

42. The method of claim 41, wherein R has structure II:

(II) 

wherein q_1, q_2, q_3, q_4, and r are independently selected from hydrogen, methyl, or ethyl; m is $-(CH_2)_n-$, wherein n is an integer from 0 to 4, inclusive; and, when r is hydrogen, at least one of q_1, q_2, q_3, and q_4 is also hydrogen; and the aldehyde has structure III:

(III) 

wherein q_1, q_2, q_3, q_4, and r are independently selected from hydrogen, methyl, or ethyl; m is $-(CH_2)_n-$, wherein n is an integer from 0 to 4, inclusive; and, when r is hydrogen, at least one of q_1, q_2, q_3, and q_4 is also hydrogen.

43. The method of claim 42, wherein the aldehyde is tetrahydrobenzaldehyde (THBE).

44. The method of claim 43, wherein the catalyst is selected from hydrochloric acid, hydrofluoric acid, a transition metal catalyst, sulfuric acid, or toluene sulfonic acid.

45. The method of claim 41, wherein the reaction is carried out as a solution process, a bulk process, a suspension process, or a melt process.

46. The method of claim 41, further comprising blending the modified EVOH with an unmodified EVOH.

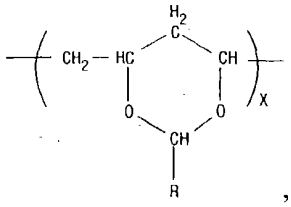
47. A method of making a modified ethylene vinyl alcohol polymer (EVOH) comprising an oxygen scavenging functional group, comprising:

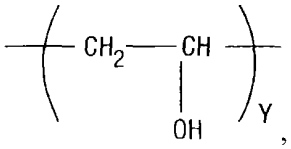
(i) providing (a) an ethylene vinyl acetate (EVA) copolymer and (b) an aldehyde comprising an olefinic or benzylic group;

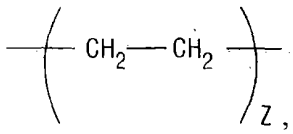
(ii) hydrolyzing the EVA copolymer in an aqueous solution, to form an EVOH copolymer; and

(iii) reacting the EVOH and the aldehyde, to form the modified EVOH.

48. The method of claim 47, wherein the modified EVOH comprises structures IV, V, and VI:

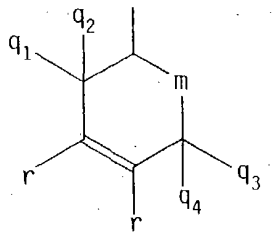
(IV)  ,

(V)  ,

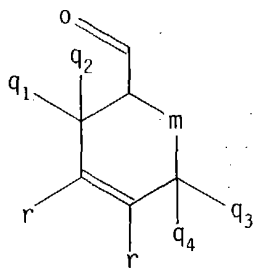
(VI)  ,

wherein x is an integer greater than or equal to 1, y is an integer greater than or equal to 1, z is an integer greater than or equal to 1, and R comprises a cycloalkenyl group.

49. The method of claim 48, wherein R has structure II:

(II) 

wherein q_1, q_2, q_3, q_4, and r are independently selected from hydrogen, methyl, or ethyl; m is $-(CH_2)_n-$, wherein n is an integer from 0 to 4, inclusive; and, when r is hydrogen, at least one of q_1, q_2, q_3, and q_4 is also hydrogen; and the aldehyde has structure III:

(III) 

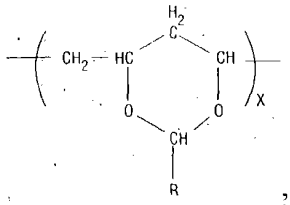
wherein q_1, q_2, q_3, q_4, and r are independently selected from hydrogen, methyl, or ethyl; m is $-(CH_2)_n-$, wherein n is an integer from 0 to 4, inclusive; and, when r is hydrogen, at least one of q_1, q_2, q_3, and q_4 is also hydrogen.

50. A method of forming a packaging article comprising an oxygen barrier layer, comprising:

(i) providing an oxygen barrier composition comprising a modified ethylene vinyl alcohol polymer (EVOH) comprising an oxygen scavenging functional group; and

(ii) forming the oxygen barrier composition into the packaging article or a layer thereof.

51. The method of claim 50, wherein the modified EVOH comprises structures IV, V, and VI:



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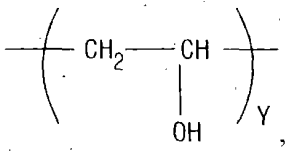
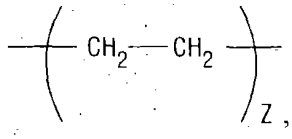


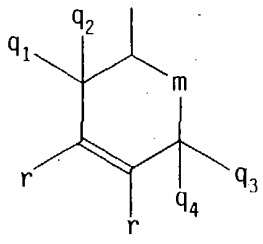
(V) ,



(VI) ,

wherein x is an integer greater than or equal to 1, y is an integer greater than or equal to 1, z is an integer greater than or equal to 1, and R comprises a cycloalkenyl group.

52. The method of claim 51, wherein R has structure II:



(II)

wherein q_1, q_2, q_3, q_4, and r are independently selected from hydrogen, methyl, or ethyl; m is $-(CH_2)_n-$, wherein n is an integer from 0 to 4, inclusive; and, when r is hydrogen, at least one of q_1, q_2, q_3, and q_4 is also hydrogen.

53. The method of claim 51, wherein the forming step comprises forming a transition metal catalyst into the oxygen barrier layer or a layer adjacent to the oxygen barrier layer of the packaging article.

54. The method of claim 51, wherein the oxygen barrier composition further comprises a photoinitiator.

55. The method of claim 51, wherein the oxygen barrier composition further comprises an antioxidant.

56. The method of claim 51, wherein the oxygen barrier composition comprises a blend of the modified EVOH and an unmodified EVOH.

57. The method of claim 56, wherein the blend comprises from about 5 wt% to about 20 wt% modified EVOH.

58. The method of claim 51, wherein two or more oxygen barrier layers of the packaging article are formed in the forming step.

59. The method of claim 51, wherein the forming step further comprises forming a second oxygen barrier layer not comprising a modified EVOH in the packaging article.

60. The method of claim 51, wherein the forming step further comprises forming a structural layer in the packaging article.

61. The method of claim 60, wherein the structural layer comprises PET.

62. The method of claim 51, wherein the forming step comprises forming a multilayer rigid container comprising, from exterior to interior: a structural layer comprising PET; the oxygen barrier layer; and a structural layer comprising PET.

63. The method of claim 51, wherein the forming step further comprises forming a moisture barrier layer in the packaging article.

64. The method of claim 51, wherein the forming step further comprises forming an oxygen scavenging layer in the packaging article.

65. The method of claim 51, wherein the forming step comprises forming the packaging article as a single layer film, a multilayer film, a single layer rigid article, or a multilayer rigid article.